MEMO

TO: DEQ Cleanup Project Managers

FROM: Toxicology Workgroup

DATE: October 28, 2002

SUBJECT: Default background concentrations for metals

When selecting metal background levels for a specific site, the preference for a source of such values is, in order: (1) those calculated from site-specific data (assuming the sampling and analysis were adequate, etc.), (2) local default values (e.g., those for SW Oregon), and (3) the regional default values for the Pacific Northwest listed in the table below. The regional default values given below can be used (1) to make an initial assessment of a site (before site-specific data are available), (2) if local default values are unavailable, or (3) to check the credibility of site-specific values. They are to be used at the discretion of the cleanup project manager, can be ignored, and should not be seen as constituting a background "standard" or "criteria". Not all metals are listed here but more of the commonly encountered ones could be added.

Table 1. Oregon DEQ Suggested Default Background Concentrations for Inorganic Contaminants in Various Environmental Media.

CHEMICAL	Soil (mg/kg, dw)	Freshwater		Marine	
		Water (μg/L)	Sediment (mg/kg, dw)	Water (μg/L)	Sediment (mg/kg, dw)
Antimony	4 (x)	<1 (h)	1 (w)	0.2 (u)	1 (v)
Arsenic	7 (s)	2 (i)	7.9 (w)	$0.005^{As(III)}$ (u) $1^{As(V)}$ (u)	9 (v)
Cadmium	1 (g)	<1 (h)	<0.5 (m)	0.1 (u)	0.9 (v)
Chromium	42 (e)	1 (h)	30 (n)	$0.002^{Cr(III)}$ (u) $0.2^{Cr(IV)}$ (u)	140 (v)
Copper	36 (g)	9 (j)	12 (o)	0.2 (u)	26 (v)
Lead	17 (f)	13.3 (k)	2 (p)	0.003 (u)	22 (v)
Mercury	0.07 (g)	<0.1 (h)	0.2 (q)	0.001 (u)	0.3 (v)
Nickel	38 (g)	5.5 (l)	20 (r)	0.5 (u)	59 (v)
Silver	1 (x)	<1 (h)	0.4 (w)	0.002 (u)	0.4 (v)
Selenium	2 (x)	0.2 (c)	0.4 (t)	$0.1^{Se(Vi)}$ (u) $0.05^{Se(IV)}$ (u)	0.5 (v)
Zinc	86 (a)	38 (b)	53 (d)	0.4 (u)	130 (v)

NOTES

(a) State-wide 90th percentile value from WDOE (1994). United States geometric mean value is 44 mg/kg (Fuhrer, 1986; Table 7). Zinc range in Oregon soils reported from <25 to 159 mg/kg (Fuhrer, 1989; Table 8).

(b) 90th percentile value of Lower Columbia River Basin data (1951 - 1993) (Fuhrer et al., 1996; Table 27). Zinc worldwide inland water background concentration reported as 10 μg/L.

(c) North American streams background concentration as reported in Fuhrer et al., 1996; Table 27.

(d) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989; Table 10). Breakpoint for zinc between natural and anthropogenically-affected sediment reported as 145 mg/kg (Rickert et al., 1977). McCoy and Black (1998) report a freshwater reference value of 88 - 110 mg/kg.

(e) State-wide 90th percentile value from WDOE (1994). United States geometric mean value for Cr is 37 mg/kg (Fuhrer, 1986; Table 7).

(f) State-wide 90th percentile value for Washington (WDOE, 1994). United States geometric mean value is 16 mg/kg (Fuhrer, 1986; Table 7). Lead range in Oregon soils reported as 1.2 to 18 mg/kg (Fuhrer, 1989; Table 8).

(g) State-wide 90th percentile value from WDOE (1994).

(h) 90th percentile value of Lower Columbia River Basin data (1994) as reported in Fuhrer et al., 1996; Table 27.

(i) 90th percentile value of Lower Columbia River Basin data (1951 - 1993) as reported in Fuhrer et al., 1996; Table 27. Arsenic worldwide inland water background concentration reported as 2 μg/L.

(j) 90th percentile value of Lower Columbia River Basin data (1951 - 1993) as reported in Fuhrer et al., 1996; Table 27. Copper worldwide inland water background concentration reported as 1.8 μg/L.

(k) 90th percentile value of Lower Columbia River Basin data (1951 - 1993) as reported in Fuhrer et al., 1996; Table 27. Lead worldwide inland water background concentration reported as 0.2 μg/L.

(l) 90th percentile value of Lower Columbia River Basin data (1951 - 1993) as reported in Fuhrer et al., 1996; Table 27. Nickel worldwide inland water background concentration reported as 0.3 μg/L.

(m) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989; Table 10). McCoy and Black (1998) report a freshwater sediment reference value of 0.2 - 0.7 mg/kg. Cadmium concentrations in Portland Harbor bottom material reported to range from 0.4 to 1.2 mg/kg (Fuhrer, 1989; Table 8).

(n) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989; Table 10). Breakpoint for chromium between natural and anthropogenically-affected sediment reported as 60 mg/kg (Rickert et al., 1977). McCoy and Black (1998) report a freshwater sediment reference value of 54 - 110 mg/kg.

(o) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989;

Table 10). Breakpoint for copper between natural and anthropogenically-affected sediment reported as 43 mg/kg (Rickert et al., 1977). McCoy and Black (1998) report a freshwater sediment reference value of 42 - 48 mg/kg.

(p) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989; Table 10). Breakpoint for lead between natural and anthropogenically-affected sediment reported as 43 mg/kg (Rickert et al., 1977). McCoy and Black (1998) report a freshwater reference value of 13 - 23 mg/kg.

(q) Average concentration in "unpolluted" Willamette River Basin samples (Rickert et al., 1977; Table 8). McCoy and Black (1998) report a freshwater sediment reference value of 0.1 - 0.11 mg/kg.

(r) Concentration in Lower Columbia River sediment at >400 cm depth (Fuhrer and Horowitz, 1989; Table 10). McCoy and Black (1998) report a freshwater sediment reference value of 23 - 54 mg/kg.

(s) State-wide 90th percentile value from WDOE (1994). 95th percentile British Columbia regional soil background estimate for As is 10 mg/kg (BCE, 1999).

(t) Highest background value reported in Nagpal and Howell (2001). McCoy and Black (1998) report a freshwater sediment reference value of 1.1 - 4.6 mg/kg.

(u) Mean concentration values from Nozaki (1997). See also Quinby-Hunt and Turekian (1983) and Quinby-Hunt, and Wilde (1986/87).

(v) Maximum reference site values from Meador et al. (1994).

(w) Highest freshwater sediment reference site value from McCoy and Black (1998).

(x) 95th percentile British Columbia regional soil background value (BCE, 1999).

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